translation for citing all German works by their French titles. LESTER F. WARD.

WASHINGTON, D. C.

Light Waves and Their Uses. By A. A. MICHELSON. Decennial Publications of the University of Chicago. Second Series, Volume III. University of Chicago Press, 1903.

The 'uses' with which this book is concerned are altogether those with which the author's name is so intimately associated; that is, the applications of interference methods whereby light waves are made the tools and units of measurements for physical and astronomical investigation. The Michelson form of interferometer, which has tremendously increased the applicability of this method, was invented as a means of attack upon one important problem which is here treated briefly —the well-known Michelson-Morley ether-drift experiment—still the subject of study, both experimental and theoretical.

An introductory chapter on wave motion and the general phenomena of interference serves to prepare the reader for the development of the interferometer principle, by which is meant the use of a plane reflecting and transmitting (glass) surface to split a beam of light into two, which are subsequently recombined, to produce interference fringes. The quantity directly measured is either a movement or shift of these fringes, or a change in their distinctness or 'visibility,' produced by changes in the relative retardation of the two beams between the points of separation and recombination. By this means changes in the relative retardation, which may in a particular case be produced by changes in position of a plane reflecting surface, can be measured with extreme accuracy. Again, the change in relative retardation may be produced by changes in the index of refraction of the medium through which one beam passes, or motion of the medium, or by the introduction of transparent films—and the corresponding shift of the fringes affords an exceedingly accurate means of measuring these changes.

Some of the many special cases in which this method has been applied are dealt with in succeeding chapters; for example, the measurement of angles and distances, the study of spectrum lines and close groups of lines, the effect of a magnetic field on light-emission, the determination of the angular magnitude and 'structure' of stars, and the fundamental, but less fascinating, matter of the use of light waves as standards of length—*i. e.*, the evaluation of the meter in terms of the wave-lengths of the red, green and blue radiations of cadmium.

The book is avowedly popular, being a reprint of Lowell Institute lectures, and the lecture style is retained throughout; nevertheless, it is to be feared that without the aid of experimental demonstrations, for which the good illustrations are hardly an equivalent, the 'general reader' would be rather overtaxed by some of the chapters. However, from the other standpoint of the preface, the book as a résumé in untechnical form, of important researches which have occupied Professor Michelson for the past twenty years, will be of great value, not only to scientists who have not read the original papers, but to many who have. C. E. M.

Index to the Literature of the Spectroscope (1887 to 1900, both inclusive). By ALFRED TUCKERMAN. Smithsonian Miscellaneous Collections, 1902.

This index forms a continuation of a previous volume by the same author, which dealt with the literature up to 1887, and continues the subject up to the time when the work was taken over by the International Committee for Indexing Scientific Literature. The first half of the book is taken up with the author index, alphabetically arranged, of which the chief characteristics should be accuracy and completeness. Concerning the former a short examination suffices to detect a fairly large number of misprints, mostly trivial, besides a few cases of confusion of names, and one erroneous reference. Again, while absolute completeness is too much to ask for, there are omissions here which do not seem based on a fair estimate of the relative importance of various papers.

The second half of the volume contains the

same titles arranged according to subject, and here the matter of judicious choice of main and subheading, the distribution of titles among them, and cross-referencing, are of especial importance. In some cases, as, for instance, the heading 'Electric spectra,' too little subdivision has been made, while in others, for example, infra-red work, too many and not sufficiently distinct subheadings have been introduced. Cross-references and a list of the subdivisions of the subject index would be a great addition; and the more frequent insertion, as is done in some cases under 'absorption spectra,' of a few words of explanation as to the scope and character of the work would add greatly to the usefulness of this part of the volume.

In spite of these faults, however, and in spite of the fact that Kayser's 'Handbuch' will doubtless contain more references, this bibliography should be of considerable value.

C. E. M.

SCIENTIFIC JOURNALS AND ARTICLES.

The American Naturalist for December, 1903, presents the third of the series of articles on 'Adaptations to Aquatic, Arboreal, Fossorial and Cursorial Habits in Mammals,' the present being by H. W. Shimer on 'Fossorial Adaptations.' These are fewer in number than those for other modes of life, but among them the writer fails to include the use of the tail as a tactile organ, making the mistake of supposing it to be 'a useless appendage.' W. Patten gives a valuable paper 'On the Structure of the Pteraspidæ and Cephalaspidæ' with the purpose of strengthening his theory on the genetic relationship between the vertebrata and arthropoda, and James G. Needham describes 'An Out-Door Equipment for College Work in Biology.' Unluckily, all colleges are not so well situated as that of Lake Forest. W. McM. Woodworth has a most interesting 'Preliminary Report on the Palvlo Worm of Samoa, *Eunice viridis* (Gray.)' W. E. Ritter gives 'Further Notes on the Habits of *Autodax lugubris*,' including the important information that this species breeds in holes in trees. The concluding paper, by Wilmatte P. Cockerell, describes 'A Trip to the Truchas Peaks, New Mexico.' The number contains the 'Quarterly Record of Gifts, Appointments, Retirements and Deaths.'

The American Museum Journal commences its fourth volume with the January number; it contains much information as to new exhibits, including notes on 'The Behavior of the Minerals and Gems of the Morgan Collections toward Radium and Other Sources of Light,' 'The Long-tailed Japanese Fowls,' 'The Draught Horse in Action,' 'Extraordinary Ants' and 'The Exhibit of Chuckchee Clothing.' The skeleton of the great Percheron, mounted by S. H. Chubb, is the best mounted skeleton we have ever seen and shows what may be done in this direction. The Supplement, Guide Leaflet No. 13, is an illustrated General Guide to the American Museum of Natural History.

SOCIETIES AND ACADEMIES.

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE twenty-fifth annual meeting was held January 12. The following officers were elected:

President—Dr. D. S. Lamb.
General Secretary—Walter Hough.
Curator—Mrs. Marianna P. Seaman.
Treasurer—P. B. Pierce.
Councilors—Dr. George M. Kober, J. D. McGuire and Dr. J. Walter Fewkes.

The 254th meeting was held January 26. Dr. W J McGee reported progress of the various expeditions to secure examples of interesting tribes for the Louisiana Purchase Exposition. It is intended to have at St. Louis families of Central African pygmies, Tehuelches of Patagonia, and Ainos of Hokkaido, and members of tribes of the United States engaged in ancient industries. A model school for Indians will be another attractive feature.

The first paper was by Professor W. H. Holmes, the title, 'One of the Great Stone Buildings of Yucatan.' The paper was illustrated by a superb model made for exhibition at St. Louis. Professor Holmes said that the architecture of the natives of America is not